

# Chronic Traumatic Encephalopathy (CTE)

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P-3184 Model T1RA



# What is CTE?

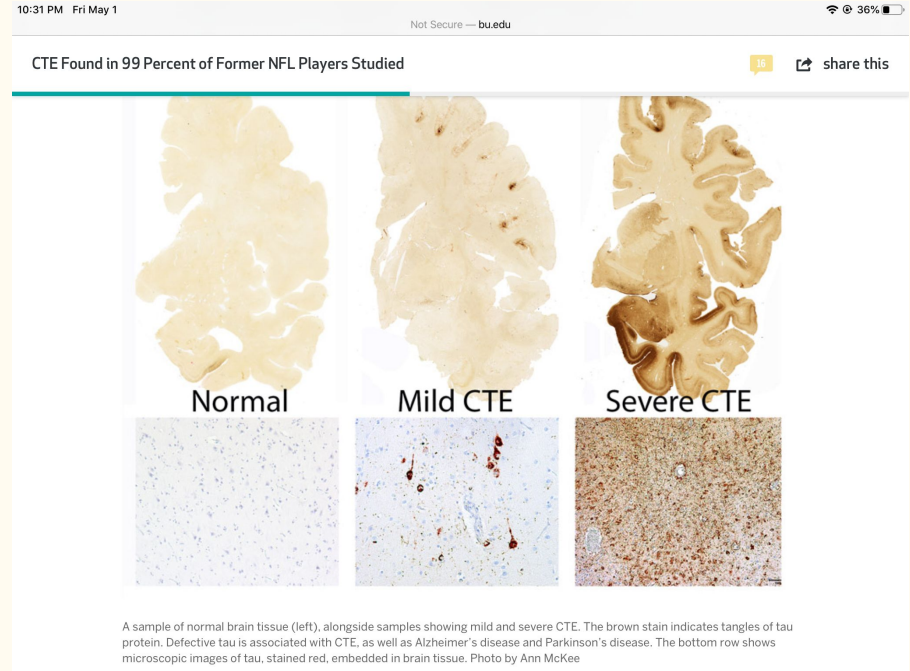
- A neurodegenerative disease caused by repetitive brain injuries (mostly caused by contact sports such as football, boxing, ice hockey, etc)
- Head impacts (from mild hits, concussions, to traumatic brain injury) lead to Tau protein build up in the brain

(Chronic traumatic encephalopathy (CTE)/Felson)

# Tau Protein

- Originally for stabilizing cells
- Brain impact destabilizes them and causes them to clump or tangle together
- These clumps kill neurons and spread to other brain cells to degrade brain functions

(Felson/Ruth, et al)



# Causes continued

- CTE was also found in veterans, other kinds of athletes, epilepsy patients, and victims of domestic abuse
- Children are more at risk—Brains less insulated than adults while children athletes could experience similar levels of head impact
- Doctors can only suspect CTE—Diagnosis could only be confirmed with autopsy (Tau protein imaging is improving to help with diagnosis and possible treatment)
- Not everyone with head injuries get CTE—Other factors like genetics may play a role but head injuries are the only confirmed cause of CTE

(Chronic traumatic encephalopathy (CTE)/Felson)

# Symptoms—I/II/III/IV Stages

-Symptoms can show up years or even decades after the last brain injury or end of sports career

-Can be similar to Alzheimer's or Parkinson's, hard to diagnose

(Felson)

# Stage I

-Headaches

-Loss of attention and concentration

(Ortiz/Wolf)



# Stage II

-Depression or mood swings,  
explosivity, and short term memory loss

-(Less common) Executive dysfunction,  
language difficulty, impulsivity, suicide  
potential

(Ortiz/Wolf)



# Stage III

- Executive dysfunction, memory loss, explosivity, and attention and concentration difficulties
- (Common) Depression or mood swings, visuospatial difficulties, and aggression
- Headaches, apathy, impulsivity, and suicidality symptoms
- ~75% of Stage III patients were found to be cognitively impaired

(Ortiz/Wolf)



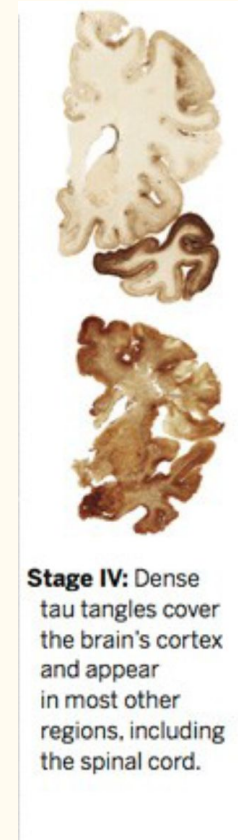
**Stage III:** Tau hot spots begin to blend with one another. Tangles appear more diffusely throughout the ridges of the brain. Tau begins to collect in the hippocampus (involved in learning and memory) and amygdala (involved in decision making and emotions).



# Stage IV

- Executive dysfunction and memory loss initially before developing severe memory loss with dementia
- Profound attention and concentration loss, executive dysfunction, language difficulties, explosivity, aggression, paranoia, depression, gait, and visuospatial difficulties
- (Less common) Impulsivity, dysarthria, and Parkinsonism
- ~31% studied were suicidal at some point

(Ortiz/Wolf)



# Death of CTE Patients

-Respiratory failure, cardiac disease, suicide, overdose, and symptoms associated with end-stage dementia and malignancy

-Personality changes caused by CTE leads to deadly complications (e: accidents/drug use/alcohol use/suicide)

(Chronic traumatic encephalopathy (CTE)/Ortiz)

# Treatment/Management

- No cure currently exist
- Management can reduce suffering
  - Behavioral therapy to deal with mood swings
  - Pain management (medicines/massage/acupuncture)
  - Exercise/Nutrition to manage pain and stress
  - Simplify the lives of the patients to reduce stress and help with their memory loss
  - Emotional control treatments. (Chronic traumatic encephalopathy (CTE)/Felson)

# Prevention

-Avoid head injuries by:

— Properly use of safety equipment

— Safe playing environment

— Follow rules and play responsibly

— Careful with impact practices (especially for children)

-Always tell doctors all known head injuries and be careful with signs of symptoms to help with early detection

(Chronic traumatic encephalopathy (CTE)/Felson)

# Works Cited

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